LAUDA

Operating instructions

LAUDA Compact-thermostat
C 6 CS, C 12 CS, C 20 CS,
K 6 KS, K 12 KS, K 20 KS

LAUDA Bridge thermostat
GCS, GKS

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Appendix

Accessories

Circuit diagram

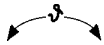
1. Brief operating instructions

- Even if you find these brief instructions initially sufficient please read the following sections, especially Section 4: "Safety devices and warning notes".
  For safe operation of the equipment it is essential that the information in these Operating Instructions is observed.
- Check thermostat and accessories during unpacking for any transport damage and if necessary inform the carrier or the postal authority.
- Assemble the unit according to Section 6 and add extra items as appropriate.
- Fitting the tubing to the pump connections:

  Without external system: for improved circulation within the bath remove the closing plugs from the two pump connections, fit the tubing nipples and link them together with e.g. Perbunan tubing (up to 120°C) or better a metal tubing.

  With external system: make tubing connections to the external system.

  Protect tubing with hose clips against slipping off.
- Use only softened water or LAUDA bath liquids (Section 5). Fill the bath up to a level about 2 cm below the cover plate.
- Check the supply voltage against the details on the label. Insert the mains plug.
- Set the potentiometer EXT fully anticlockwise to INT!
- Move the temperature setting to the required temperature.

  Pressing the key shows the operating temperature setpoint on the display. The adjustment is made on the potentiometer  . Release the locking device before moving this control.

- Set the overtemperature protection at the control to some value above the setpoint. When the red signal lamp lights up, reset the system by pressing the reset key drücken.
- When connecting up an external system, ensure that filling this system does not cause the level inside the thermostat to fall more than is permitted.

  If the setpoint of the bath liquid is reached, the yellow pilot lamp "Heating" starts to flash. Having settled the digital thermometer displays the setpoint.

- Operating safety

  The thermostat must be operated only with non-flammable bath liquids, or with flammable bath liquids up to no more than 25 K below their flashpoint, otherwise there is a possibility that a flammable atmosphere may form (see Item 4.2).

- WARNING

  Parts of the bath cover may reach temperatures above 70°C when working at higher temperatures.The outflow and return pipes of the pumps reach the operating temperature. Touching them is dangerous because of high or low temperatures!

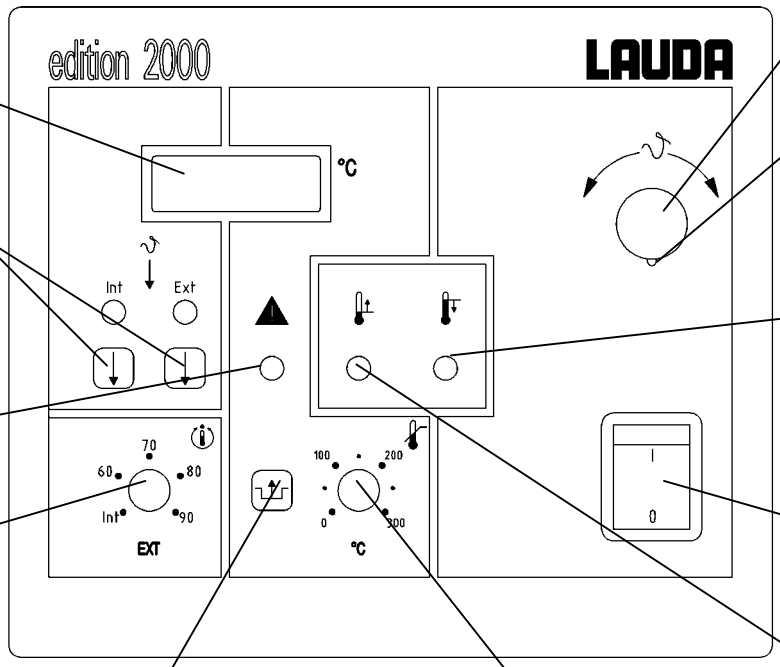
2. Technical Data (to DIN 58966)

Type		C 6 CS	C 12 CS	C 20 CS	K 6 KS	K 12 KS	K 20 KS	GCS	GKS
Operating temperature range	(°C)	-30...300							
Working temperature range	(°C)	45...300	40...300	35...300	50...300	40...300	45...300	25...300	30...300
With water cooling (water 15°C)	(°C)	20...300 (⩾ section 4.4.5)							
Ambient temperature range	(°C)	5...40	5...40	5...40	5...40	5...40	5...40	5...40	5...40
Temperature setting / Resolution		digital with 10-turn potentiometer and numerical display, resolution 0,1°C							
Bath temperature measurement		built-in digital thermometer with LED display; 0,1°C resolution, absolute accuracy better than 0,2 % of reading ±0,2 K*); temperature probe Pt 100 to DIN IEC 751							
External temperature measurement		built-in separate measuring system using external Pt 100 to DIN IEC 751, 4-wire circuit, can be switched to LED display, accuracy 0,05 % of reading ± 0,1 K (without temperature probe)							
Temperature control		PID controller with adjustable external proportion and adjustable Xp							
Temperature variation at 70°C in the bath	(°C)	0,01*)							
Heater power	(kW)	2	2	2	3	3	3	2	3
Effective surface area of cooling coil	(cm²)	350							
Safety system		Adjustable overtemperature protection and low-level protection to EN 61010 (DIN 12879, class 2)							
Pump output against zero head Pressure/suction Pump pressure (max.)	 (L/min) (bar)	 20/16 0,32/0,25	 20/16 0,32/0,25	 20/16 0,32/0,25	 24/18 0,5/0,34	 24/- 0,5/-	 24/18 0,5/0,34	 20/16 0,32/0,25	 24/18 0,5/0,34
Pump connections	(I.W.)	M 16x1; Nipples 13 Ø							
Filling volume max.	(L)	4...6	9...14	14...21	4,5...7,5	6...12	11...18	---	---
Bath openinge (W x D)	(mm)	150x130	300x175	300x350	150x130	150x130	300x175	---	---
Bath depth	(mm)	160	160	160	200	320	200	Min. 160	Min. 160
Usable liquid depth	(mm)	140	140	140	180	300	180	---	---
Height to top of bath	(mm)	220	220	220	260	380	260	---	---
Overall size (W x B x H)	(mm)	200x350x 420	375x415x 420	375x590x 420	200x350x 460	225x375x 580	375x415x 460	310x185x 360	310x185x 395
Weight	(Kg)	12	19	23	14	19	22	8,5	9,5
Power consumption	(V;Hz)	230;50 / 230;60 Protection class 1 to VDE 016							
Loading (max.) without accessories	(kW)	2,2	2,2	2,2	3,2	3,2	3,2	2,2	3,2
Current take up (max.) with accessories	(A)	15	15	15	16	16	16	15	16
Nominal current of fuses (max.) on customers side	(A)	T 16 A							
		Units are conform to EU Guideline 89/336/EWG (EMC) and 73/23/EWG (low-voltage) and carry the CE mark (230 V; 50 Hz).							
Ref. No.									
230V; 50Hz		**LCB 155**	**LCB 157**	**LCB 159**	**LCB 163**	**LCB 165**	**LCB 167**	**LCG 108**	**LCG 109**
230V; 60Hz		**LCB 255**	**LCB 257**	**LCB 259**	**LCB 263**	**LCB 265**	**LCB 267**	**LCG 208**	**LCG 209**

Units of different power supplies may have different heating capacities as well as different values for power consumption (see type label)!

Technical changes reserved!

*) see item 4.3



LED-Display
LED-Display
Indication LED

Taster „Display-Umschaltung“
Key „Shift display“ and „Setpoint“
Touche „Commutation d’affichage“ et „Valeur de consigne“

Kontrollleuchte „Störung“
Pilot lamp „Fault“
Lamp „Perturbation“

Externreglereinstellung
Adjustment of external controller
Ajustage du régulateur externe

Temperatureinstellung
Temperature adjustment
Ajsutage de témperature

Arretierung
Locking device
Arrètage

Kontrollleuchte „Kühlung“
(nur bei Option MVC)
Pilot lamp „Cooling“
(only at option MVC)
Lampe témoin „Réfroidissement“
(uniquement en cas d’option MVC)

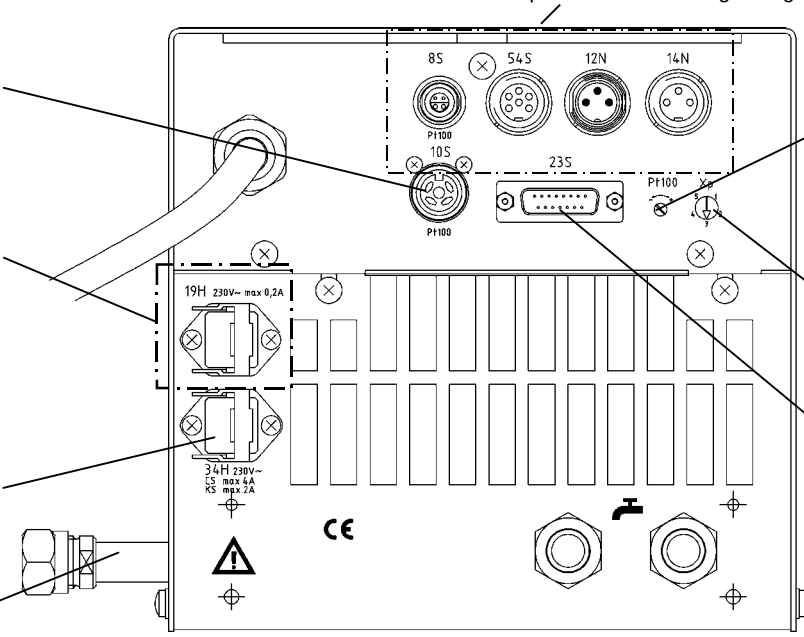
Netzschalter
Mains switch
Interrrupteur général

Kontrollleuchte „Heizung“
Pilot lamp „Heating“
Lampe témoin „Chauffage“

Taster „Entsperren“
Push button „Reset“
Touche „Réarmement“

Übertemperatureinstellung
Overtemperature adjustment
Ajustage de surtémperature

Steckverbindung für Schnittstelle SAD **(OPTION)**
Plug connector for interface analog/ digital **(OPTION)**
Connecteur pour interface analogue/ digit **(OPTION)**



Buchse für ext. Pt 100
Socket for external Pt 100
Douille pour sonde Pt 100 externe

Anschluss f. Magnetventil **(nur bei Option MVC)**
Connection socket for solenoid valve **(only at option MVC)**
Douille de branchement pour l’electro vanne **(uniquement en cas d’option MVC)**

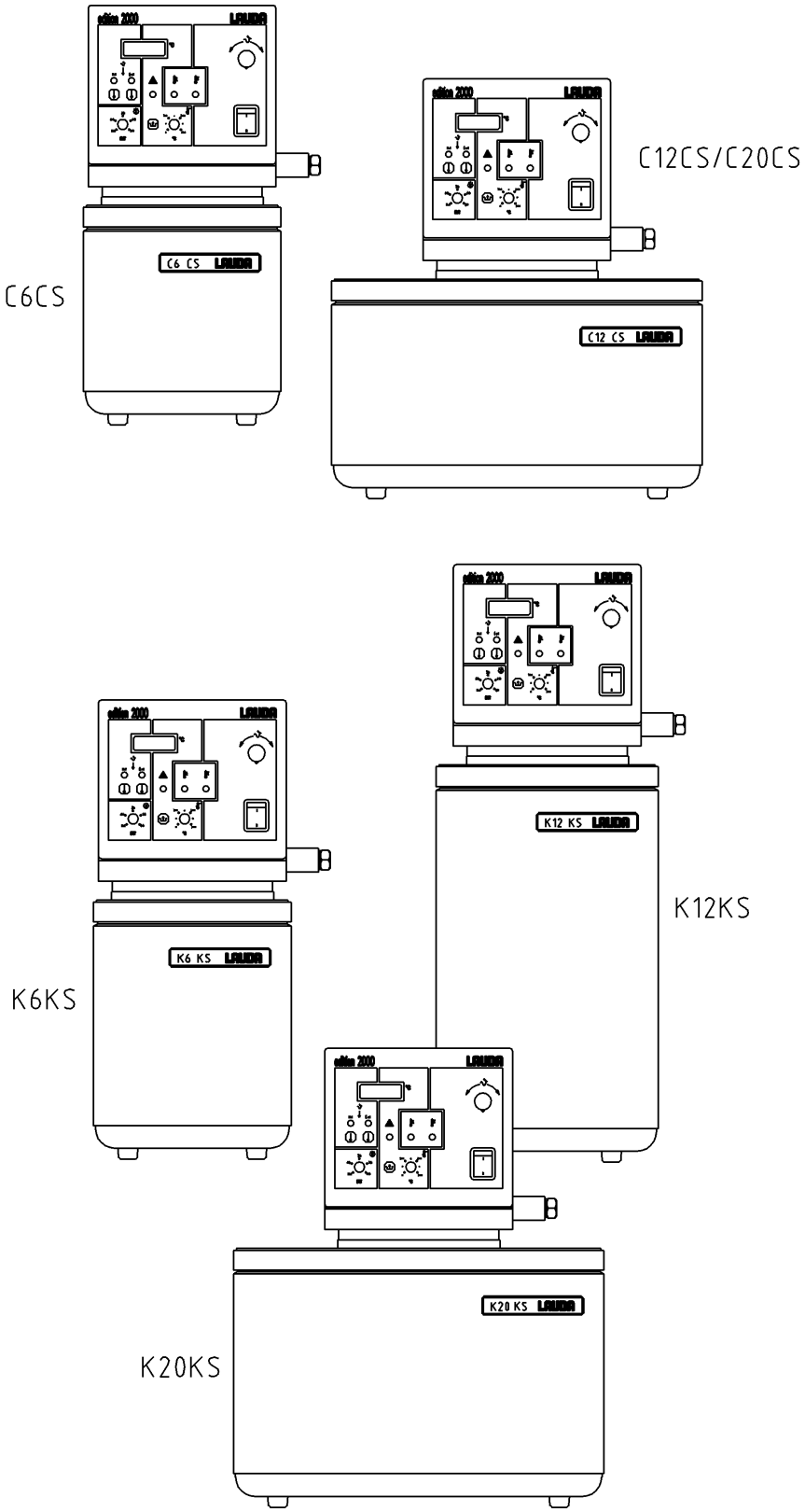
Netzspannungsausgang
Mains supply output
Sortie tension secteur

Pumpenstutzen
Pump nozzles
Tubulures de pompe

Abgleichpotentiometer für ext. Pt 100
Trimming potentiometer for external Pt 100
Potentiomètre de tarage pour Pt 100 ext.

Einstellung Xp
Adjustment Xp
Ajustage Xp

Multifunktionsanschluss
Multifunction connector
Connecteur d’entrée-sorties


C6CS
C12CS/C20CS
K6KS
K12KS
K20KS

3. General construction and technical description

3.1 Operating principle

The LAUDA bath/circulation thermostats Series C and K with Electronics S differ in bath volume, bath depth, pump type and output as well as in heating capacity.
Bridge thermostats GCS and GKS with telescopic rods for universal bath applications on baths of a width of 310 to 550 mm.
All types offer the operating temperature range of -30°C...300°C. Laboratory thermostats operate with liquids (operating medium, heat transfer fluid) which serve for energy transfer to the product to be thermostated.
The thermostated products can be immersed in the thermostatic bath (bath thermostat), or placed in an external open bath whose liquid is circulated by the pump of the thermostat. When operating as circulator the thermostatic liquid is pumped through an external heat exchanger arranged by the user in which the product is being thermostated (jacketed vessels, reactors, heat exchangers).

3.2 Materials

All materials in contact with the bath liquid are made from high-grade stainless steel or materials of similar anti-corrosion properties.

3.3 Cooling coil

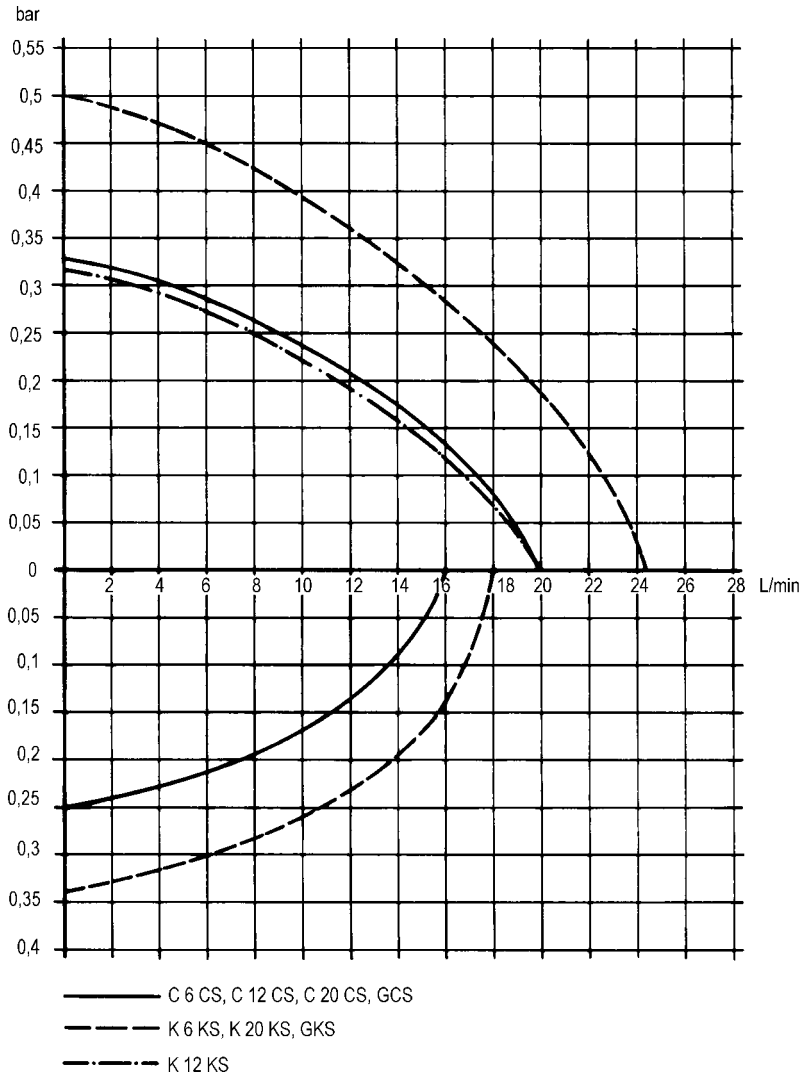
All units are fitted with a cooling coil which permits cooling, e. g. with water, for working temperatures in the range of ambient temperature. (➢ Section 4.4.5 and 8.)

3.4 Pumps

All units except Type K 12 KS are equipped with a centrifugal pressure/suction pump. This can be used to operate both external open baths and closed external systems (reactors).
The immersion pumps are supplied in the two performance classes C and K. The thermostat K 12 KS is fitted with a pure pressure pump since this unit operates specially in the high temperature range.
The pumps operate perfectly up to a viscosity of approx. 70 mm^2/s (K 12 KS approx. 120 mm^2/s), with the pump output decreasing rapidly with increasing viscosity.

Pump characteristic

230 V; 50 Hz



3.5 Control

The units employ a Pt 100 resistance thermometer for measuring the bath temperature. The temperature is indicated on a green LED display. The setpoint is selected on a 10-turn precision potentiometer with locking device and is indicated on the LED display. A PID controller produces fully electronic control of the tubular heater (in the bath) using a triac with burst firing action.
Tubular heaters with a surface loading of approx. 6 W/cm^2 are employed.

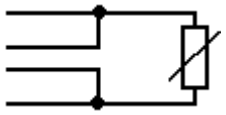
3.6 External controller

An additional signal circuit permits connection of an external Pt 100 resistance thermometer to DIN IEC 751 whose indication can be switched to the display; a proportion of this signal can be coupled into the control system. This arrangement greatly reduces the influence of disturbances on the temperature in the external consuming device.
The external measurement is also available on the multifunction connector 23 S.
(⩾ Section 3.7).

Connection for external Pt 100 at rear plug connection 10 S in 4-wire circuit.

Pin connections socket 10 S Pt 100

Pin 1	+ I	Current path
Pin 2	+ U	Voltage path
Pin 3	- I	Voltage path
Pin 4	- U	Current path



Pt 100

-pin plug for Pt 100 connection Cat.-No. EQS 014

Use screened connecting cables. Connect screen to plug case. Cover connectors not in use with protective caps!

3.7 Multifunction connector

15-pin connector 23 S on the back, with multiple function.

Use screened connecting cables. Connect screen to plug case. Cover connectors not in use with protective caps!

Pin 1:	bath temperature recorder connection, correct sign; 10 mV/°C; Ri ≈100 Ohm, internal recorder resistance ≥ 1 MOhm (0V Pin 3)
Pin 2:	Pt 100 EXT; 4-wire -current path
Pin 3:	0V reference potential for measurement signas ⏚
Pin 4:	programme or external setpoint input 10 mV/K, added to the selected setpoint. The sum of both setpoints is displayed on pressing key ↓. Ri = 20 kOhm (0V pin 3)
Pin 5:	output signal, only for accessory units (0V pin 12)
Pin 6:	setpoint output 10 mV/°C, Ri ≈ 100 Ohm. Load resistance ≥ 10 kOhm (0V pin 3)
Pin 7:	+12 V supply voltage, max. additional loading 20 mA
Pin 8:	reference voltage approx. 5 V, load resistance ≥ 10 kOhm (0V pin 3)
Pin 9:	Pt 100 EXT; 4-wire - voltage path
Pin 10:	-12 V supply voltage, max. additional loading 20 mA (0V pin 12)
Pin 11:	Pt 100 EXT; Vierleiter +current path

Pin 12:	0V-load reference potential ⏚
Pin 13:	18 V if red fault lamp is alight, i.e. safety circuit to DIN 12879 has operated. Ri ≈ 1 kOhm;I max = 10 mA (0V pin 12)
Pin 14:	recorder connection for external temperature, correct sign, 10 mV/K, Ri ≈ 100 Ohm; internal recorder resistance ≥ 1 MOhm (0V pin 3)
Pin 15:	Pt 100 EXT; 4-wire + current path

Pins 2, 9, 11 and 15 Pt 100 EXT are parallel to socket 10 S. They must not be connected up if socket 10 S is in use.

In case of a fault the signals appearing at this connector can usefully be employed for the initial investigation of the fault.

15-pin connector	Cat.-No. EQM 030
Housing for above	Cat.-No. EQG 017

3.8 Mains supply output 34 H

The 230 V supply voltage is available at the socket 34 H at the back in normal operation and with the unit switched on. The maximum current which can be drawn there is 2 A. In case of a fault this voltage is switched off. This output can be used e.g. to connect a non-return fitting (Cat. No. UD 125).

Suitable mating plug	Cat.-No. EQS 045

3.9 Controlled cooling (MVC) Option

As an option the units can be equipped in our company for controlled cooling to operate a solenoid valve which controls the cooling water flow.
It ensures faster heating up, greatly reduced water consumption, and improved temperature control during heat dissipation since the heater does not operate against the cooling action.

Controlled cooling (factory fitted)	Cat.-No. LCZ 852
Solenoid valve for cooling water control	Cat.-No. UD 085

3.10 Remote operation (FBC) Option

As another option the units can be converted for remote control; the entire electronics with control panel is removed from the unit and used for remote operation. An adapter for the cable connections is required on the basic unit and the control panel is placed in an extra housing. The conversion must be carried out by a qualified electrician. All necessary components except for the connection cables are supplied as part of the kit.
Please specify the length of the connection cables.

Conversion kit for remote operation FBC	LCZ 960
Set of cables for remote operation FBC 5 m long	UK 235
Set of cables for remote operation FBC length as specified	UK 238

19" adapter to take the control panel
of the remote operation system FBC 5 HE
for one or two panels LRZ 009

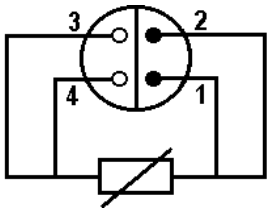
3.11. SAD connection to NE 28 (Option)

The connector according to NAMUR recommendation NE 28 is located at the back of the control unit if option SAD is fitted.

Use screened connecting cables. Connect screen to plug case. Cover connectors not in use with protective caps!

8 S: Pt 100 connection (EXT) (Lemosa plug)

1	=	Pt 100 (EXT) I+
2	=	Pt 100 (EXT) U+
3	=	Pt 100 (EXT) U-
4	=	Pt 100 (EXT) I-



Note: only one of the Pt 100 inputs, socket 10 S or 8 S, may be used at a time!

54 S: Signalverbindung

1	=	external temperature 0-10 V (0 V = -100°C / 10 V = 400°C)
2	=	internal temperature 0-10 V (0 V = -100°C / 10 V = 400°C)
3	=	earth of measurement signals (pin 1, 2, 5)
4	=	control signal 4 - 20 mA (4 mA = -100°C / 20 mA = 400°C). At 0°C setpoint setting 0°C!
5	=	control signal 10 mV/°C (parallel to MF 23 S pin 4)
6	=	earth of the control signal (linked int. to pin 3)

Note: of the three control signal (programmer) inputs (23 S pin 4, 54 S pin 4 and 5) only one pin may be used at a time!

12 N: floating contact general fault

1 = n.o. (closing)

2 = common

3 = n.c. (opening)

1, 2 = are closed under normal conditions

3-pin mating socket — Cat.-No. EQD 047

14 N: contact input, fault

1 = n.o. (closing)

2 = common

3 = not used
mating plug with link 1, 2 is included in the unit

Interface SAD to NE 28 — Cat.-No. LCZ 959
factory fitted or retrofit kit

4. Safety devices and warning notes

4.1 Safety functions

The built-in overtemperature limiter is adjustable with a tool (screwdriver) between 0°C and 300°C.
The bath temperature is sensed by a separate Pt 100 resistance thermometer and processed by a separate electronics. When exceeding the set switching point the unit is switched off permanently on all poles (limiter function).

The red signal lamp lights up and at the multifunction connector 23 S a signal of approx. 18 V appears at contact 13.

A float switch with magnetic coupling acts as low-level cut-out and also switches off the unit (pump and heater) permanently on all poles.
The switch-off function of the safety circuit remains stored during a break in the supply or after switching off the supply.

Reset is possible only after rectifying the fault, using the reset key .

The safety devices are conform to EN 61010-2-010.

The pump motor is fitted with a temperature monitor which switches off if the motor winding overheats. The heater is also switched off simultaneously. After the motor winding has cooled down the pump starts up automatically.

4.2 Why can a thermostat be dangerous?

Thermostats are equipped with heaters which supply the necessary heat to the thermostating liquid. If the temperature control fails or if the liquid level is too low, the heater may reach temperatures which can lead to a fire in the laboratory, especially in combination with flammable liquids.

When using the thermostat as a circulation thermostat a hose may break, causing hot liquid to spill and endangering people and goods.

The safety requirements on thermostats therefore depend on whether

- non-flammable or flammable liquids are used
- operation is with or without supervision.

The thermostats described in these Operating Instructions are protected against overtemperature and low liquid level if used according to the descriptions indicated in these Operating Instructions.

The units can be operated with non-flammable bath liquids, and with flammable bath liquids up to 25 K below their flashpoint (EN 61010), while DIN 12879 requires a safety spacing of only 5 K to the flashpoint. In each case it is assumed that there is correct adjustment and regular testing (see Item 9.7) of overtemperature and low-level protection.

4.3 Important notes

The user is only protected against those hazards which are caused by exceeding the temperature and by low liquid level.

Further hazards may arise from the type of product being thermostated, e.g. a shift above or below certain temperature levels or fracture of the container and a reaction with the thermostatic liquid etc.
It is impossible to cover all possible causes and they remain largely within the decision and responsibility of the user.

Values for temperature variation and indication accuracy apply under normal conditions according to DIN 58966. In special cases high-frequency electromagnetic fields may lead to less favourable values. There is no loss of safety.

Units are in accordance with EMC directive EN 61 326-1, class A *:
Units are only suitable for use in industrial areas as disturbing voltage fluctuations might occur.

Warning: The units must only be used according to the descriptions indicated in the Operating Instructions.
This includes operation by properly qualified and instructed personnel.
The units are not designed for operation under medical conditions according to EN 60601-1 or IEC 601-1!

4.4 Warning notes ⚠

4.4.1 Temperatures

Parts of the bath cover may reach temperatures above 70°C when working at higher temperatures. The outflow and return pipes of the pumps reach the operating temperature. Touching them is dangerous because of high or low temperatures!

4.4.2 Mains connection

Connect the unit only to mains sockets with protective earth contact (PE) which must not have a fuse higher than T 16 A!

4.4.3 Mains cable

We have ensured that the mains cable and other plug connections do not touch any hot parts. Please check that there is no contact between the connecting tubings filled with hot liquid, other hot parts and the mains cable!

* Notice only valid for EU countries

4.4.4 Fume extraction

Depending on the bath liquid used and the operating method there is a possibility that toxic vapours may be produced. In that case it is necessary to provide appropriate fume extraction. Pull out the mains plug before cleaning the bath with solvents. Provide appropriate fume extraction. Before starting up the unit it is absolutely essential to ensure that the bath contains no explosive mixture. If necessary purge it with nitrogen!

4.4.5 Cooling water, steam production

Use cooling coils with cooling water only at operating temperatures below 100°C; at higher temperatures there is a danger that steam may be produced.
When changing the bath liquid from water to heat transfer fluids for temperatures above 100°C any remaining water - including the one in the hoses and external system - has to be removed completely. Otherwise there is a danger of burns because of delayed boiling.

5. Bath liquids and hose connections

The operating temperature ranges specified for the bath liquids and the tubings are for general information only and may be restricted through the operating temperature range or safety requirements specified in the appropriate standards (see Item 4.2).

5.1 Bath liquids

LAUDA Designation		Working-temperature-range	Chem. Designation	Viscosity (kin)	Viscosity (kin) at temperature	Fire-point	Ref.No. Quantity		
	Former designation	from °C to °C	at 20°C	mm²/s	mm²/s		5 l	10 l	20 l
	Water	+5...+90	deionised water ①	--	--	--			
Kryo 30 ②	G 100 ②	-30...+90	Mono-ethylene-glycol/water	4	50 at -25°C	--	LZB 109	LZB 209	LZB 309
Ultra 350	330 SCB	+30...+200	synthetic thermal oil	47	28 at +30°C	> 240	LZB 107	LZB 207	LZB 307
Ultra 300	Ultra-Therm SW 300N	+80...+300	Silicone oil	170	35 ... +80°C	> 400	LZB 108	LZB 208	LZB 308

① At higher temperatures → Evaporation losses → Use bath covers (⩾ Section 10. Accessories). Distilled water or fully deionised water must only be used with the addition of 0.1g sodium carbonate (Na_2CO_3) /l water, otherwise→ danger of corrosion!

② Water content falls after prolonged operation at higher temperatures → mixture becomes flammable (flash point 128 °C). → Check the mixture ratio with a densitometer.

– When selecting bath liquids it should be noted that performance must be expected to worsen at the lower limit of the operating temperature range due to increasing viscosity. The full operating range should only be utilised if really necessary.

– The operating ranges of the bath liquids and tubing represent general data which may be limited by the operating temperature range of the unit.

Silicone oil causes pronounced swelling of Silicone rubber → never use Silicone oil with Silicone tubing!

DIN Safety data sheets are available on request!

5.2 Hose connections

Tubing type	Int. dia. Ø mm	Temperature range °C	Application	Ref. No.
EPDM-tubing uninsulated	9	10...120	for all bath liquids except Ultra 350 and mineral oils	**RKJ 111**
EPDM-tubing insulated	9	-60...120	for all bath liquids except Ultra 350 and mineral oils	**LZS 019**
EPDM-tubing uninsulated	12	10...120	for all bath liquids except Ultra 350 and mineral oils	**RKJ 112**
EPDM-tubing insulated	12 ext. dia. 35mm approx	-60...120	for all bath liquids except Ultra 350 and mineral oils	**LZS 021**
Silicone tubing, uninsulated	11	-30...100	water, water/glycol mixture	**RKJ 059**
Silicone tubing, insulated	11 ext. dia. 35mm approx	-60...100	water, water/glycol mixture	**LZS 007**

- EPDM-tube <u>not</u> for Ultra 350 and mineral oils!
- Silicone oil causes pronounced swelling of Silicone rubber → never use Silicone oil with Silicone tubing!
- Protect tubing with hose clips against slipping off.

Metal hoses single-layer insulation	Tube connection	Ø i (mm)	Ø a (mm)	Temperature range °C	Length	Ref. No.
MC 50	M 16x1	10	18	-10...400	50	**LZM 040**
MC 100	M 16x1	10	18	-10...400	100	**LZM 041**
MC 150	M 16x1	10	18	-10...400	150	**LZM 042**
MC 200	M 16x1	10	18	-10...400	200	**LZM 043**
Pump link	M 16x1	10	18	-10...400	20	**LZM 044**

Metal hoses with insulation	Tube connection	Ø i (mm)	Ø a (mm)	Temperature range °C	Length	Ref. No.
MK 50	M 16x1	10	44	-90...150	50	**LZM 052**
MK 100	M 16x1	10	44	-90...150	100	**LZM 053**
MK 150	M 16x1	10	44	-90...150	150	**LZM 054**
MK 200	M 16x1	10	44	-90...150	200	**LZM 055**
Pump link	M 16x1	10	44	-90...150	20	**LZM 045**

Further details on thermostatic liquids and hoses can be found in our special publication.

6. Unpacking, assembly and setting up

6.1 Unpacking

Goods are packed carefully, largely preventing transport damage. If unexpectedly some damage is visible on the equipment, the carrier or the postal authority has to be informed so that it can be inspected.

Standard accessories:

		Cat.-No.
1 Bath cover	for C 6 CS, K 6 KS, K 12 KS	HDQ 069
1 Bath cover	for C 12 CS, K 20 KS	HDQ 067
2 Bath cover	for C 20 CS	HDQ 067 und HDQ 068
4 Nipples 13 mm dia		HKO 026
4 Screw caps		HKM 032
2 Closing plugs	not for RK 8 CS	HKN 065

Operating Instructions

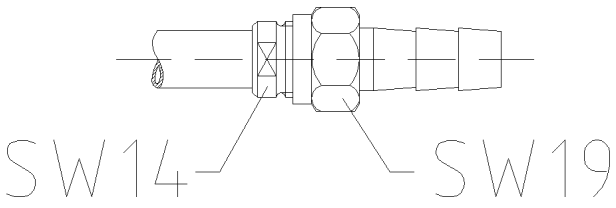
6.2 Setting up, Operation as bath thermostat

Set up the unit conveniently so that the control panel is towards the front and ensure that the air circulation for the units through the ventilating openings at the back of the unit is not restricted. A minimum spacing of 20 cm is recommended.

Close the drain cock at the back of the bath!

When operating as bath thermostat - no external system connected up - it is advisible to ensure internal circulation by removing the closing plugs from the pump flow and return connections. Remove the screw caps and link the pump connections together using a piece of tubing.
As a permanent arrangement the hose link of flexible insulated metal tubing (Cat. No. LZM 044) is the best and safest solution

NOTE: When loosening or tightening the screw caps (19 mm a/f), hold the threaded nipple on the tubing connections with a spanner (14 mm a/f)!



7. Connection of external systems

7.1 Closed external circuits

Remove the closing plugs by releasing the threaded rings (19 mm a/f) from the outflow and return connections and replace them by the tubing nipples (13 mm dia.) supplied.
If the thermostat is connected to closed external circuits, additional liquid must be poured in after the thermostat is switched on until the level in the bath remains at the correct height (approx. 2 cm below top plate).

At higher operating temperatures it is necessary to allow during filling for the expected expansion in volume of approx. 8% per 100°C.

For suitable tubing materials see Section 5. We recommend metal tubings for temperatures above 100°C.

With external systems at a high level it may happen even in closed circuits that the external volume drains down and the thermostat tank overflows if the pump is stopped and air enters the thermostated system!

Always ensure the maximum possible flow area in the external circuit (nipples, tubing, system). This results in a larger flow and therefore improved thermostatic control.

Always protect tubing with hose clips against slipping off, or use stainless steel hoses with screwed connections.

NOTE: When loosening or tightening the screw caps (19 mm a/f) at the tubing connections hold the threaded nipple with a spanner (14 mm a/f)!

7.2 Open systems (baths)

The units (except for K 12 KS) are equipped with a pressure/suction pump. This can be used for circulation to closed external circuits at higher pump outputs and in particular also to open external baths. There are two possibilities for maintaining the level in external baths:

1. The suction tubing is mounted in the external bath so that its end is at the required liquid level. The flow of the pressure stage is restricted with a tubing clamp on the hose from the pressure connection to the external bath so that the flow of the pressure stage is restricted slightly below that of the suction stage. This becomes noticeable by the entry of air into the suction tubing.
   This operating method is not recommended, in particular at temperatures below 0°C and when using oil at elevated temperatures

2. The preferred solution is the use of the LAUDA level controller (Cat. No. LPZ 901) which provides the functions of adjustable level control with float, srew-on connetion for external bath, and clamp fitting for 4 mm dia. Pt 100 probe.

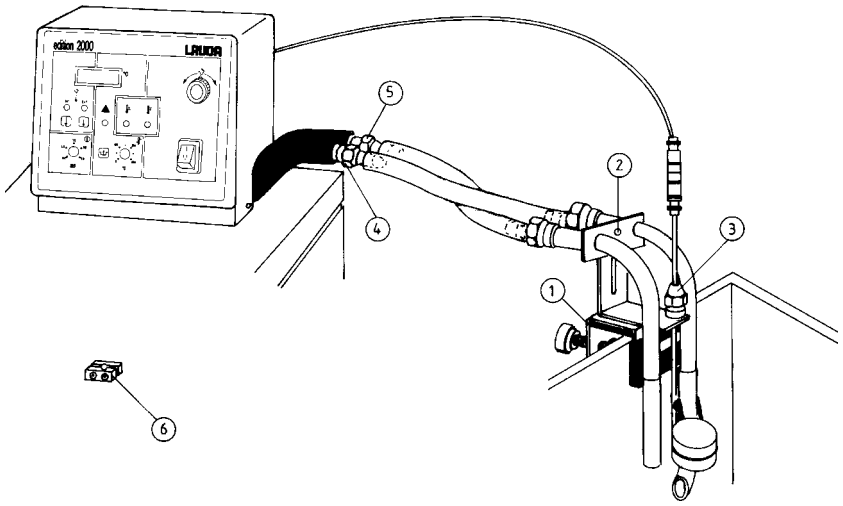
Fitting the level controller Best.-Nr. LPZ 901

The level controller is mounted on the external bath using the screw clamp ①. The mounting is suitable for both round and rectangular baths.
Height adjustment after loosening the screw ②.
Make sure that there is good circulation and that the float can move freely!

Make the hose connections to the thermostat, connect the pressure nipple ④ to the pressure side and the suction nipple ⑤ to the suction side (see diagram).

Clamp fitting for Pt 100 probe (4 mm dia.)

The clamp is not required on these units!



It is advisable to set up the external bath at the same level.

If the difference in level between the open external bath and the thermostat bath is greater than 0.5 m there is the possibility in certain applications that the control range of the level controller is not sufficient. With higher external bath level the suction hose should then be clamped off to such an extent that a constant level in the bath is obtained at which the float is within its control range. If the external level is low the pressure hose has to be similarly restricted by partly clamping it off.

WARNING: If thermostat and external bath are not at the same level it is essential to provide venting of the connecting hoses when the pump is swiched off in order to prevent overflowing.

It is preferable to use the Non-Return Fitting (see Accessories) which is mounted at the highest point of hose connection (bath or thermostat connection) and which is linked electrically to the mains output 34 H.

Non-Return Fitting Cat-No. UD 125

Always protect tubing with hose clips against slipping off, or use stainless steel hoses with screwed connections.

Achtung: When tightening the screw caps (19 mm a/f) at the tubing connections, hold the threaded nipple with a spanner (14 mm a/f)!

8. Cooling the thermostat

Because of the frictional heat of the circulating pump, thermostating without cooling can only start appreciably above ambient temperature (⩾Technical data, working temperature range, lower limit). For lower temperatures it is essential to work with cooling.
The following possibilities are available for cooling:

8.1 Mains water cooling

Depending on water temperature down to 15°C. The thermostats are equipped with a cooling coil (at the rear), which is linked by tubing to the water tap and to the drain.

Flow should be kept as low as possible; this saves water and improves temperature control. Controlled cooling is possible when using option MVC (⩾ Section 3.9).

8.2 Through flow chillers

Can be used, depending on thermostat type, down to -15°C (DLK 10), -30°C (DLK 25) or -40°C (DLK 45). Use insulated tubing for the hoses from the flow and return connections on the pump to the chiller nipples. If the thermostat operates in a closed external circuit the chiller is connected in the return line from the external system to the thermostat.

Always use water-glycol mixture (ratio 1:1).

9. Starting up

9.1 Filling

Fill the unit with bath liquid to suit the operating temperature, see Section 5. The filling volume is given under Technical data. In general the thermostat must be filled no higher than 2 cm below the cover plate. When working with thermal oils (e.g. Ultra-Therm 330 SCB) slightly less liquid should be used to allow for expansion. The level must obviously not fall below the minimum, otherwise the low-level protection swiches off the unit (see Safety circuit). The same applies to filling an external system by the pump during start-up.

9.2 Connection to supply

Connect the unit only to an earthed socket (PE). Compare the details on the label with the mains voltage (⩾ Section 4.4.2).

Model according to EMC directive EN 61326-1 (industrial areas only).*

When working without external system, ensure that the pump connections are linked together (metal hose link Cat. No. LZM 044), or use the closing plugs.

Notice only valid for EU countries!

9.3 Basic function

Set potentiometer EXT fully anticlockwise (INT)!

Set the potentiometer for the overtemperature switch-off point to suit the required operating temperature, with due consideration for the bath liquid.
When operating below ambient temperature the overtemperature cut-out setting must of course be above ambient temperature until the operating temperature is reached. Then the switch-off point can be set slightly above the bath temperature (at least approx. 0°C).

Switch on the mains switch. The green signal lamp lights up. Briefly press the left key

Int. The bath temperature is indicated. When the red signal lamp lights up, briefly press the reset key .

Using the keys Int and Ext the display can be switched to bath temperature (Int) or the temperature of the external Pt 100 (Ext) irrespective of the control mode selected (INT-EXT).

The indication is on the green signal lamps Int and Ext. At the same time the display indicates the setpoint when pressing one of the two keys .

To adjust the setpoint press one of the keys , release the locking device on the setpoint knob and select the setpoint according to the display. Lock the knob again - release the key.

The lamp shows the operation of the heater. At the control point this lamp flashes according to the heater power.

After the operating temperature has been lowered the lamp obviously starts to flash only after the set temperature has been reached.

The lamp has only a function in conjunction with option MVC.

The controller gain X_p can be adjusted on the back of the control unit. The adjustment range 1...5 corresponds to a proportional band of 0.4...16°C referred to the heater control signal. The standard setting at which the unit is shipped from the factory is 3. Usually it is not necessary to change the adjustment.

The scale is non-linear with the following values:

Xp	P-band
1	0.4°C
2	1.5°C
3	2.5°C
4	4.5°C
5	16.0°C

If there are any control oscilliations, e.g. in small baths with bath liquids of low thermal capacity and high viscosity, X_p is set to the next higher setting (e.g. from 2 to 3).

9.4 External controller

Connect the Pt 100 resistance thermometer to socket 10 S (⩾ Section 3.6). Switch over the display by pressing the key ↓ Ext. The temperature display flashes if no external Pt 100 is connected.

Using the potentiometer Pt 100 – ○ + on the back of the control unit the external Pt 100 can be trimmed to a known temperature. This can be done using the bath temperature, for example, if no other temperature reference is available.

When used with external control, i.e. the measurement point for the control parameter is located outside the thermostat at a point selected by the user, the potentiometer EXT can be used to select a value between approx. 50% and 90% for the proportion of the external probe.

The closer the external Pt 100 probe is connected with the circulated bath liquid, the higher the external proportion (e.g. 90%) can be chosen.This increases the quality of the control results related to the external measuring points.

Suggested setting for a 2 litre jacketed reactor with water-glycol, external resistance thermometer in the product space, product slightly stirred. EXT 90 %, Xp 2.

With the selected simple control method there remains a permanent deviation between external controlled temperature and setpoint, depending on the proportion of the external measurement parameter; this deviation has to be compensated by re-adjusting the setpoint!

Example: selected potentiometer EXT 80, setpoint 80°C.

After the system has settled down, the external measured temperature is 79.5°C. Increase the setpoint by 0.5 K, then the external measured temperature rises to 80°C.

9.5 Operation with programmer

Am A programmer Type PM 351-1 can be connected to the multifunction connector 23 S to vary the setpoint of the thermostat according to a given programme.
This requires that the energy balance (heating, cooling, load) of the thermostat matches the requirements of the programme (heating rate, cooling rate, operating temperatures). The plug must not be put into 23 S when adjusting the unit setpoint to the lowest temperature of the programme. This value is entered as value A when programming the programmer. Do not change the unit setpoint any more and put in the plug of the programmer connecting cable.

Operation of the push buttons ↓ indicates on the digital display the current setpoint which is provided by the programmer and on which the unit is operating.

For further details refer to the Operating Instructions for the PM 351-1.

9.6 Working with controlled cooling MVC (Option)

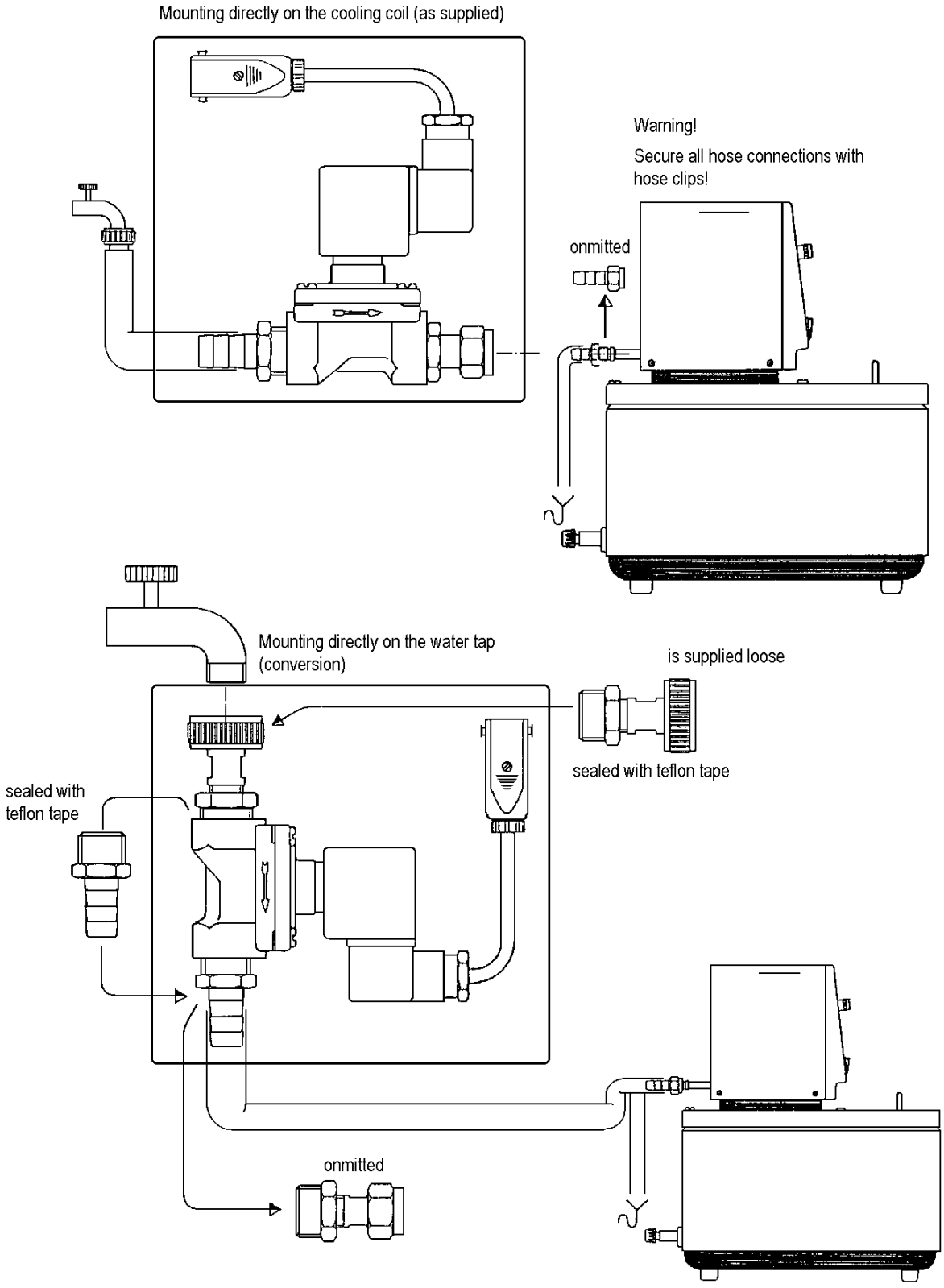
If the units are equipped with option MVC, operation with controlled water cooling is possible. Insert the plug of the solenoid valve into the socket (19 H) on the back. The solenoid valve can be fitted either on the cooling coil or on a 1/2" water tap. Although fitting on the cooling coil is the usual method, mounting directly on the water tap is preferable for two reasons. When the valve is closed, the connection hose to the cooling coil is not under pressure; there is therefore no pressure surge when the valve is switched on, and the danger of the hose bursting is much reduced. Use hose clips!
With controlled cooling operation the solenoid valve switches with a cycle time of about 5 s.

The green signal lamp indicates the status of the solenoid valve. Restrict the water flow as much as possible at the water tap. This produces improved control and saves cooling water.

Warning: Ensure that cooling coil connectors are being used, do not mix them up with pump connectors. It is essential to ensure free outflow from the cooling coil, especially at operating temperatures above 100°C because of steam formation! The use of controlled cooling is particularly helpful when initiating exthermal reactions or in programmer operation.

Solenoid valve for cooling water control	Cat.-No.	UD 085
Mating plug for other solenoid valve	Cat.-No.	EQS 005

Connection instructions for the solenoid valve


Mounting directly on the cooling coil (as supplied)
Warning!
Secure all hose connections with hose clips!
onmitted
Mounting directly on the water tap (conversion)
is supplied loose
sealed with teflon tape
sealed with teflon tape
onmitted

9.7 Safety circuit

The operation of the safety devices of the units has already been described in Item 4.1. After starting up the user should confirm the correct operation of the safety devices. If the unit is operating unsupervised we recommend that this check should be carried out daily.

For proper operation of the low-level limiter it is essential that the float switch is operating correctly. This can be checked by draining some of the liquid. When the level drops below the minimum level (about 20 mm above the upper heater winding) the pump and the heater are switched off on all poles.

The pilot lamp "Fault" is on. For restarting fill in bath liquid and press the Reset key
.

To check the overtemperature limiter its switch-off point is gradually reduced. When it is below the value shown on the digital thermometer the unit must switch off as under Item 9.7.1.
To distinguish between "Overtemperature" and "Level" faults the dot on the right in the display is flashing when the overtemperature switch-off point has been exceeded.
Faults in the temperature probe (break, short circuit) also lead to switch-off and flashing of the right dot in the display.
Set the switch-off point again above the bath temperature and operate the Reset key.

In case of any failure in Items 9.7.1 and 9.7.2 the unit must immediately be taken out of operation and must be tested by a qualified engineer, otherwise its safety is no longer ensured.

10. Maintenance

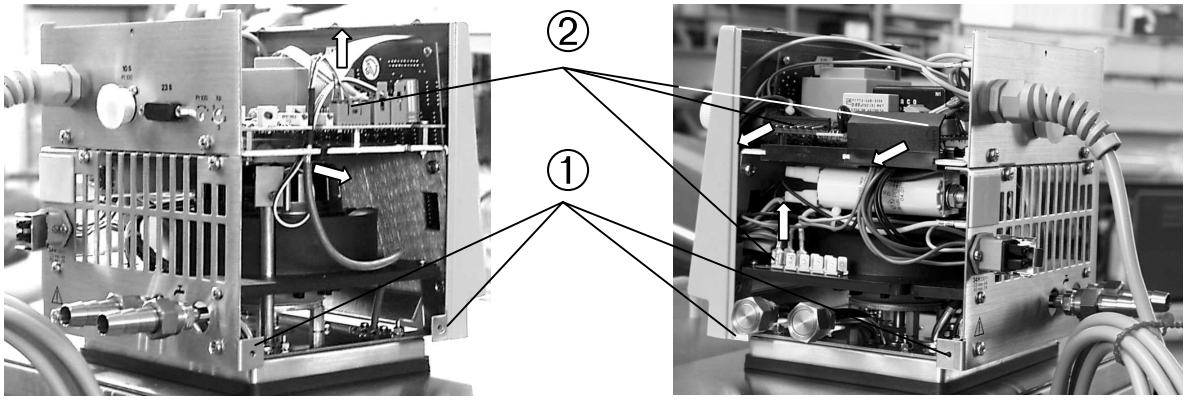
10.1 Safety notes in case of repairs

Always pull out the mains plug for all repair and cleaning operations! Repairs on the control unit with cover removed must only be carried out by a qualified electrician.

10.2 Repair

LAUDA thermostats are largely free from maintenance. Dirty thermostatic liquid should be removed through the drain cock and replaced. If the unit should become faulty it may be advisable to return only the faulty module where appropriate.

The control unit can readily be removed after removing the cover, releasing 4 screws ① (2 turns) behind the front panel and 2 screws at the rear and disconnecting the electrical connections ②.
The module with pump, heater, temperature probe etc. can also be easily separated from the bath.



There is no provision for a fuse for the complete unit since the necessary 16A fuse corresponds to the mains fuse usually provided at the location.

10.3 Cleaning

The unit can be cleaned using a cloth moistened with water with the addition of a few drops of (domestic) detergent. No water must find its way into the control unit.

The user is responsible for any necessary decontamination if dangerous materials have been spilled on or inside the unit. This applies in particular if the unit is removed for a different use, for repair, storage etc.

The method of cleaning or decontamination is determined by the expertise of the user himself. If the user has any doubts on whether this may damage the unit he has to contact the manufacturer.

10.4 Spares ordering

When ordering spares please specify the equipment type and number on the label. This avoids queries and prevents supply of incorrect goods!

We shall always be happy to deal with queries, suggestions and complaints.

LAUDA DR. R. WOBSER
GMBH & CO. KG
P.O. Box 1251
97912 Lauda-Königshofen
Germany
Phone: (+49) (0) 9343/ 503-0
Fax: (+49) (0) 9343/ 503-222
E-mail info @ lauda.de
Internet http://WWW.lauda.de

Accessories for LAUDA Compact Thermostats C-S and K-S

RS 232 C Interface R 61/2 — Cat.No. LRT 013

Using the RS 232 C (V24) Interface with A/D and D/A converter it is possible with all suitably equipped computers to read out temperatures from the thermostat and to transmit a temperature (setpoint) to the thermostat. In addition the fault signal can be called up. Programming and automatic running of ramps and contact programming are possible.

Connecting cable R 61/2 to thermostat — Cat. No. UK 085
length 1.2 m

LAUDA Through-Flow Chillers
for cooling thermostats, in particular at operating temperatures below the working temperature range.

DLK 10	Cat.-No. LFD 010
DLK 25	Cat.-No. LFD 108
DLK 40	Cat.-No. LFD 109

Racks in stainless steel
for test tubes, centrifuge tubes etc.

Bath C 12 up to 2 racks
Bath C 20 up to 4 racks

RD 13	for 56 tubes 10 - 13 dia., 80 mm immersion	Cat.-No. UG 066
RD 18/1	for 33 tubes 14 - 18 dia., 80 mm immersion	Cat.-No. UG 067
RD 18/2	for 33 tubes 14 - 18 dia., 110 mm immersion	Cat.-No. UG 068
RD 30	for 14 tubes 24 - 30 dia., 110 mm immersion	Cat.-No. UG 069

Bath C 6 1 rack

RE 13	for 56 tubes 10 - 13 dia., 80 mm immersion	Cat.-No. UG 070
RE 18/1	for 33 tubes 14 - 18 dia., 80 mm immersion	Cat.-No. UG 071
RE 18/2	for 33 tubes 14 - 18 dia., 110 mm immersion	Cat.-No. UG 072
RE 30	for 14 tubes 24 - 30 dia., 110 mm immersion	Cat.-No. UG 073

Bath C 6 1 rack

RF 18/1	for 20 tubes 14 - 18 dia., 80 mm immersion	Cat. No. UG 074
RF 18/2	for 20 tubes 14 - 18 dia., 110 mm immersion	Cat. No. UG 075

Bath K 6 1 rack

RG 18/1	for 20 tubes 14 - 18 dia., 80 mm immersion	Cat. No. UG 076
RK 18/2	for 20 tubes 14 - 18 dia., 110 mm immersion	Cat. No. UG 077

Details of other racks on request.

Rising platform for retrofitting size 250x160 mm, with continuous height adjustmentsuitable for: Bath C 12 (1 platform) Bath C 20 (2 platforms) Bath K 20 (1 platform)	Cat. No. LCZ 012
Gable cover, stainless steel for C 20	Cat. No. LCZ 011
Level controller for thermostating an open external bath using pressure/suction pump	Cat. No. LPZ 901
Non-return fitting for automatic venting of the connecting hoses when thermostating an open external bath	Cat. No. UD 125
Nipples for pump connections and cooling coil connections 13 mm dia., 10 mm int. dia. 11 mm dia., 7 mm int. dia.	Cat. No. HKO 026 Cat. No. HKO 025

LAUDA Pt 100 platinum resistance thermometers
to DIN IEC 751 Class A for external control
and other temperature measurement

Pt 100-42 — Cat. No. ETP 049
all-glass version with NS 14/23 ground taper DIN 12242
Temp. range -100...300°C
50% response time 0.8 sec
Overall length approx. 115 mm
4-wire circuit
Fig. 1

Pt 100-44 — Cat. No. ETP 007
all-glass version with NS 14/23 ground taper DIN 12242
Temp. range -100...300°C
50% response time 0.8 sec
Overall length approx. 320 mm
Fig. 2

Pt 100-66 — Cat. No. ETP 008
as Pt 100-44
Overall length approx. 430 mm
Fig. 2

Pt 100-90 — Cat. No. ETP 050
stainless steel protection tube 4 mm dia.
Temp. range -100...300°C
50% response time 1.5 sec
Overall length approx. 120 mm
4-wire circuit
Fig. 3

Pt 100-70 — Cat. No. ETP 009
stainless steel protection tube 4 mm dia.
Temp. range -200...300°C
50% response time 1.5 sec
Overall length approx. 290 mm
4-wire circuit
Fig. 3

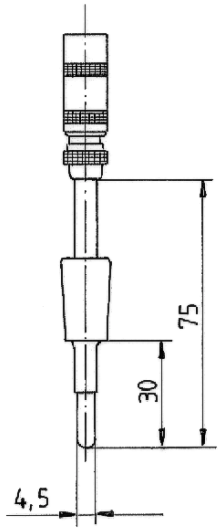
Pt 100-92 — Cat. No. ETP 051
stainless steel protection tube 4 mm dia.
with attached Silicone cable 2 m long and plug
Temp. range -100...200°C
50% response time 3 sec
Overall length approx. 250 mm
4-wire circuit
Fig. 4

Connecting cable
with 4-pin plug for external control on
all C-and K-units and for
digital thermometer

for Pt 100-44 and Pt 100-66 1.5 m	Cat. No. UK 048
length as specified	Cat. No. UK 213
for Pt 100-42, Pt 100-70, Pt 100-90 1.5 m	Cat. No. UK 047
length as specified	Cat. No. UK 212

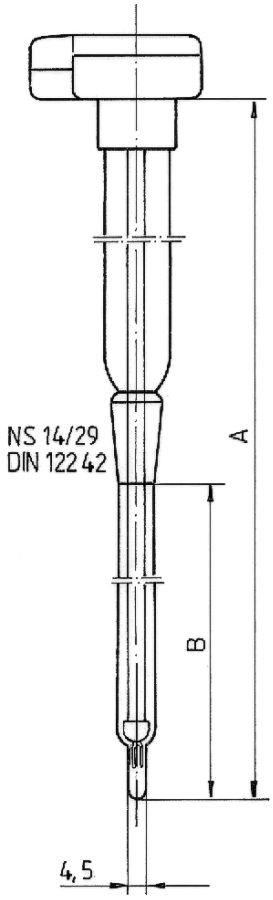
Screw clamp fitting — Cat. No. HX 078
stainless steel, with Teflon pressure ring
for Pt 100 resistance thermometer 4 mm dia.
Fig 5

Fig. 1



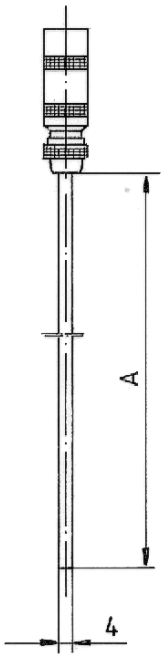
Pt 100-42

Fig. 2



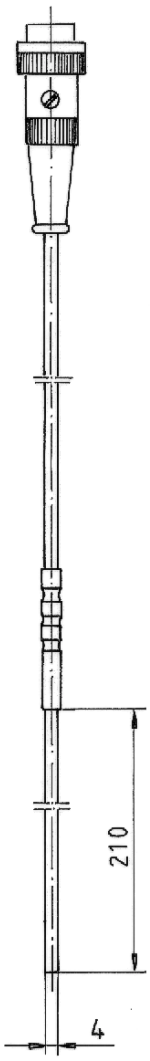
	A	B
Pt 100-44	300	135
Pt 100-66	410	245

Fig. 3



	A
Pt 100-90	80
Pt 100-70	250

Fig. 4



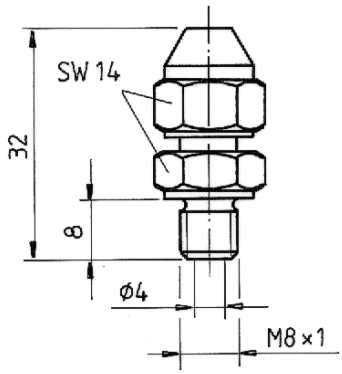
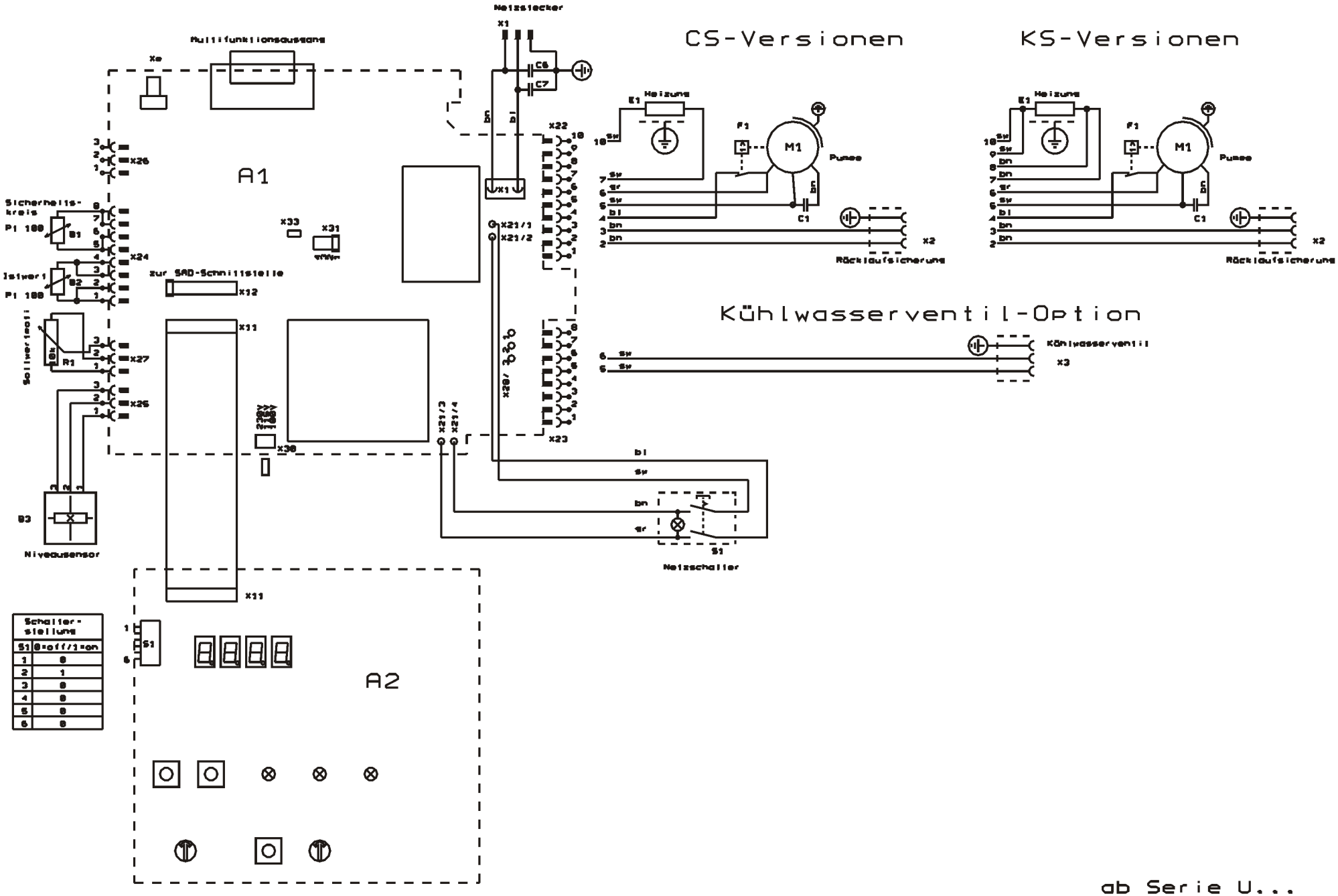


Fig. 5

Für diese Zeichnung behalten wir uns alle nicht ausdrücklich eineräumten Nutzungsrechte einschließlich der Vervielfältigung und Weitergabe an Dritte vor. Technische Änderungen vorbehalten



				Datum	28.12.1995				
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LAUDA
Dr.R.Wobser GmbH & Co KG

Schaltplan
Schéma de connexions
Circuit diagram

CxCS / KxKS

Blatt 1
1 Bl.

12.04. 2

Geräteliste Schaltplan **C 6 CS** **gültig ab Serie V01**
List of parts Circuit diagram **C 12 CS** **at serial no.**
Liste de schéma connexions **C 20 CS** **à partir**
230V; 50Hz / 230V; 60Hz

Teil-Nr. Part No. Piéce no.	Bezeichnung	Designation	Désignation	Best.-Nr. Ref.-No. No.Ref
A 1	Leiterplatte „Netz“	Printed circuit board „Mains“	Circuit imprimé „Secteur“	UL 429-3
	Leiterplatte „Netzkühlwasserventil“	Printed circuit board „Mains cooling water valve“	Circuit imprimé „Secteur de réfroidissement clapet d‘eau“	UL 432-2
A 2	Leiterplatte „Anzeige“	Printed circuit board „Indication“	Circuit imprimé „Affichage“	UL 430-2
B 1	Pt 100 Fühler Sicherheitskreis	Pt 100 Probe Safety circuit	Pt 100 Sonde Circuit securité	ETP 046
B 2	Pt 100 Fühler Regelung	Pt 100 Probe Controller	Pt 100 Sonde Réglage	ETP 046
B 3	Niveausensor	Level sensor	Niveau sensor	EKS 034
C 1	Motorkondensator	Motor condenser	Condensateur moteur	ECA 012
E 1	Heizkörper	Heater	Corps de chauffe	EH 162
F 1	Übertemperaturschutz (Umwälzpumpe)	Overtemperature protection (Circulating pump)	Protection de surpression (Pompe de circulation)	----------
M 1	Pumpenmotor	Pump motor	Moteur de pompe	EM 093
R 1	Potentiometer Sollwert	Setpoint potentiometer	Potentiomètre valeur de consigne	UD 339
S 1	Netzschalter	Mains switch	Interrupteur secteur	EST 032
X 1	Netzanschluss / Netzkabel	Mains connection / Mains cable	Branchement secteur / Câble de secteur	EKN 008
X 2	Anschlussbuchse Rücklaufsicherung	Connection socket Reflow security valve	Douille de jonction Protection de refoulement	EQD 037+ EQZ 006
X 2	Anschlussbuchse Kühlwasserventil	Connection socket Cooling water valve	Douille de jonction Vanne de refroidissement	EQK 004+ EQZ 006

Geräteliste Schaltplan **K 6 KS** **gültig ab Serie V01**
List of parts Circuit diagram **K 20 KS** **at serial no.**
Liste de schéma connexions **à partir**
230V; 50Hz / 230V; 60Hz

Teil-Nr. Part No. Piéce no.	Bezeichnung	Designation	Désignation	Best.-Nr. Ref.-No. No.Ref
A 1	Leiterplatte „Netz“	Printed circuit board „Mains“	Circuit imprimé „Secteur“	UL 429-3
	Leiterplatte „Netzkühlwasserventil“	Printed circuit board „Mains cooling water valve“	Circuit imprimé „Secteur de réfroidissement clapet d‘eau“	UL 432-2
A 2	Leiterplatte „Anzeige“	Printed circuit board „Indication“	Circuit imprimé „Affichage“	UL 430-2
B 1	Pt 100 Fühler Sicherheitskreis	Pt 100 Probe Safety circuit	Pt 100 Sonde Circuit securité	ETP 046
B 2	Pt 100 Fühler Regelung	Pt 100 Probe Controller	Pt 100 Sonde Réglage	ETP 046
B 3	Niveausensor	Level sensor	Niveau sensor	EKS 034
C 1	Motorkondensator	Motor condenser	Condensateur moteur	ECA 007
E 1	Heizkörper	Heater	Corps de chauffe	EH 150
F 1	Übertemperaturschutz (Umwälzpumpe)	Overtemperature protection (Circulating pump)	Protection de surpression (Pompe de circulation)	----------
M 1	Pumpenmotor	Pump motor	Moteur de pompe	EM 094
S 1	Netzschalter	Mains switch	Interrupteur secteur	EST 032
X 1	Netzanschluss / Netzkabel	Mains connection / Mains cable	Branchement secteur / Câble de secteur	EKN 008
X 2	Anschlussbuchse Rücklaufsicherung	Connection socket Reflow security valve	Douille de jonction Protection de refoulement	EQD 037+ EQZ 006
X 2	Anschlussbuchse Kühlwasserventil	Connection socket Cooling water valve	Douille de jonction Vanne de refroidissement	EQK 004+ EQZ 006

Geräteliste Schaltplan **K 6 KS** **gültig ab Serie V01**
List of parts Circuit diagram **K 20 KS** **at serial no.**
Liste de schéma connexions **à partir**
230V; 50Hz / 230V; 60Hz

Teil-Nr. Part No. Piéce no.	Bezeichnung	Designation	Désignation	Best.-Nr. Ref.-No. No.Ref
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	Leiterplatte „Netzkühlwasserventil“	Printed circuit board „Mains cooling water valve“	Circuit imprimé „Secteur de réfroidissement clapet d‘eau“	UL 432-2
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B 1	Pt 100 Fühler Sicherheitskreis	Pt 100 Probe Safety circuit	Pt 100 Sonde Circuit securité	ETP 046
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S 1	Netzschalter	Mains switch	Interrupteur secteur	EST 032
X 1	Netzanschluss / Netzkabel	Mains connection / Mains cable	Branchement secteur / Câble de secteur	EKN 008
X 2	Anschlussbuchse Rücklaufsicherung	Connection socket Reflow security valve	Douille de jonction Protection de refoulement	EQD 037+ EQZ 006
X 2	Anschlussbuchse Kühlwasserventil	Connection socket Cooling water valve	Douille de jonction Vanne de refroidissement	EQK 004+ EQZ 006

BESTÄTIGUNG / CONFIRMATION / CONFIRMATION

An / To / A:
LAUDA Dr. R. Wobser • LAUDA Service Center • Fax: +49 (0) 9343 - 503-222

Von / From / De :

Firma / Company / Entreprise: _____

Straße / Street / Rue: _____

Ort / City / Ville: _____

Tel.: _____

Fax: _____

Betreiber / Responsible person / Personne responsable: _____

Hiermit bestätigen wir, daß nachfolgend aufgeführtes LAUDA-Gerät (Daten vom Typenschild):
We herewith confirm that the following LAUDA-equipment (see label):
Par la présente nous confirmons que l'appareil LAUDA (voir plaque signalétique):

Typ / Type / Type :	**Serien-Nr. / Serial no. / No. de série:**

mit folgendem Medium betrieben wurde
was used with the below mentioned media
a été utilisé avec le liquide suivant

_____

_____

_____

_____

Darüber hinaus bestätigen wir, daß das oben aufgeführte Gerät sorgfältig gereinigt wurde, die Anschlüsse verschlossen sind, und sich weder giftige, aggressive, radioaktive noch andere gefährliche Medien in dem Gerät befinden.

Additionally we confirm that the above mentioned equipment has been cleaned, that all connectors are closed and that there are no poisonous, aggressive, radioactive or other dangerous media inside the equipment.

D'autre part, nous confirmons que l'appareil mentionné ci-dessus a été nettoyé correctement, que les tubulures sont fermées et qu'il n'y a aucun produit toxique, agressif, radioactif ou autre produit nocif ou dangeureux dans la cuve.

Stempel **Seal / Cachet.**	**Datum** **Date / Date**	**Betreiber** **Responsible person / Personne responsable**

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